

## CLIMATE NARRATIVE, August 2020 and as noted

Climate\_Narratives may be found, [https://coastwatch.pfeg.noaa.gov/elnino/coastal\\_conditions.html](https://coastwatch.pfeg.noaa.gov/elnino/coastal_conditions.html)  
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### UNITED STATES WEST COAST AND NORTH PACIFIC

During late **August** 2020, US west coast (20-200 km offshore) satellite derived sea surface temperature (SST<sub>Ag</sub>) anomaly was negative ( $\geq -2.5^{\circ}\text{C}$ ) off northern California and southern Oregon, where SST<sub>Ag</sub> was  $12^{\circ}$ - $16^{\circ}\text{C}$ . Low magnitude negative anomalies occurred from Point Conception to Point Pinos ( $34.4^{\circ}$ - $36.5^{\circ}\text{N}$ ) where SST<sub>Jy</sub> was  $15^{\circ}$ - $17^{\circ}\text{C}$ . Positive SST<sub>Ag</sub> anomaly ( $\leq 2^{\circ}\text{C}$ ) occurred along the Southern California Bight and northern Mexico, extending 800 km offshore, with coastal SST<sub>Ag</sub> exceeding  $23^{\circ}\text{C}$  and offshore SST<sub>Ag</sub> reaching  $25^{\circ}\text{C}$ . The larger part of the Pacific Ocean north of  $30^{\circ}\text{N}$  had positive SST<sub>Ag</sub> anomalies. Between  $30^{\circ}$ - $50^{\circ}\text{N}$ , a persistent band of positive anomaly ( $\leq 2.5^{\circ}\text{C}$ ), often more than 1500 km wide, extended zonally across the Pacific, from offshore Washington State and Canada to the shores of Japan, Korea and China. Areas of positive anomaly on the western end extended south of the equator and through Indonesia into the northern Indian Ocean. Average SST<sub>Ag</sub> conditions occurred over a relatively small area between  $35^{\circ}$ - $50^{\circ}\text{N}$  west of the date line ( $180^{\circ}\text{E/W}$ ). On the warm band's eastern side positive anomaly eased, but persisted in the eastern Bering Sea and extended into the Chukchi Sea. East of  $135^{\circ}\text{N}$  negative to neutral anomalies were seen from the equator to  $12^{\circ}\text{N}$ . <https://www.ospo.noaa.gov/Products/ocean/sst/anomaly/>  
[https://coastwatch.pfeg.noaa.gov/elnino/coastal\\_conditions.html](https://coastwatch.pfeg.noaa.gov/elnino/coastal_conditions.html) (current)  
<https://coastwatch.pfeg.noaa.gov> <https://climateanalyzer.org/wx/DailySummary/#sstanom> (current)  
<https://www.ospo.noaa.gov/Products/ocean/sst/contour/index.html>  
<https://psl.noaa.gov/data/gridded/data.noaa.oisst.v2.highres.html>

August **Sea Level Height Anomaly** (SLA) analyses of the Pacific Ocean ( $30^{\circ}\text{S}$ - $40^{\circ}\text{N}$ ), had patterns similar to those observed in previous months. Negative SLA ( $\geq 12$  cm) deepened along the eastern boundary from the equator poleward of  $40^{\circ}\text{N}$ . Between  $5^{\circ}$ - $30^{\circ}\text{N}$  negative SLA ( $\geq -15$  cm) reached across the Pacific Ocean from North America to Indonesia, the Philippine Islands, and Southeast Asia. This SLA trough included a depression of -30 cm centered near  $12^{\circ}\text{N}$ ,  $145^{\circ}\text{W}$ . Areas of positive SLA occurred along the western Pacific boundary from the equator to  $7^{\circ}\text{N}$  and from  $19^{\circ}$  to  $40^{\circ}\text{N}$ . These areas of positive anomaly were intermittently continuous with a band of positive SLA anomaly that extended eastward across the north Pacific north of  $30^{\circ}\text{N}$ .

[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/ocean/weeklyenso\\_clim\\_81-10/wksl\\_anm.gif](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wksl_anm.gif) (current)

During August, surface **chlorophyll-a** (chl-a) concentrations of  $0.5$ -  $2.5$   $\text{mg}/\text{m}^3$  were seen 20- 200 km offshore between Guerrero Negro, Mexico and Vancouver Island, Canada ( $27^{\circ}$ - $50^{\circ}\text{N}$ ). This [coastal zone](#) of high chl-a appeared widest between  $37^{\circ}$ - $47^{\circ}\text{N}$ , reaching 300 km seaward. Areas of chl-a concentration between  $5$ - $10$   $\text{mg}/\text{m}^3$  occurred in a 25-100 km inshore areas between  $42^{\circ}$ - $48^{\circ}\text{N}$ . Similar ( $0.5$ -  $2.0$   $\text{mg}/\text{m}^3$ ) chl-a distributions were observed in the Gulf of Alaska and into the Bering Sea. Areas south of Point Conception ( $34.4^{\circ}\text{N}$ ), along the Southern California Bight and northern Mexico, had  $0.5$ -  $2.0$   $\text{mg}/\text{m}^3$  in coastal areas that were not continuous along shore. Oceanic chl-a concentrations 500-1500 km off Washington were about  $0.1$ - $0.7$   $\text{mg}/\text{m}^3$  and were common across the north Pacific north of  $43^{\circ}\text{N}$ . Surface water of  $0.5$ - $1.5$   $\text{mg}/\text{m}^3$  chl-a extended more than 160 km south of Point Conception. Low chl-a oceanic water ( $0.05$ - $0.09$   $\text{mg}/\text{m}^3$ ) was found nearshore shore at  $31^{\circ}\text{N}$  (50 km) and  $47^{\circ}\text{N}$  (150 km). Coastal areas along the US west coast were partially cloud covered during late August. [Recent](#)

imagery is available. [https://coastwatch.pfeg.noaa.gov/coastwatch/CWBrowerWW180.jsp#https://coastwatch.pfeg.noaa.gov/elnino/coastal\\_conditions.html](https://coastwatch.pfeg.noaa.gov/coastwatch/CWBrowerWW180.jsp#https://coastwatch.pfeg.noaa.gov/elnino/coastal_conditions.html) (current)

### Monthly coastal temperature from shore stations and near-shore buoys

Shore and nearshore water temperature measurement locations are listed in decreasing latitude. Each line begins with a shore station or buoy abbreviation followed by latitude. Temperature values are in brackets with the average of available monthly values first (followed by the range and standard deviation) in parens and change from previous observed monthly mean. Averages for the (first, second and third) monthly terciles are within the second parens, followed by the multiyear monthly average, where available. Subscripts H and L show the tercile where the highest and lowest monthly temperatures occurred.

August shore and near shore temperatures were: 1) 15°C or less at SFrn northward and generally more than 15°C at Mtry southward, 2) within 1.0°C of long term means, 3) less than 1.0°C different from July mean temperatures, except at prtO and CCty where mean temperatures increased 1.5°C and 1.6°C, respectively 4) standard deviations of the mean were generally more than 1°C at PrtO southward and about 0.9-1°C to the north. At PrtS and northward, highest values occurred during and after the second tercile and at PrtS southward lowest values occurred in the first tercile.

#### Amphitrite Point, B.C. 48.9°N

Neah, 48.5°N, 124.7°W [12.4 (10.7-16.3, 1.0); 0.6 (12.0<sub>H</sub>, 13.2, 12.0<sub>L</sub>) 11.8°C]

#### Cape Flattery 48.4°N

NeBy, 48.4°N [11.5 (9.4-13.6, 0.9)-0.1 (11.6<sub>H</sub>, 12.0<sub>H</sub>, 11.0<sub>L</sub>)°C]

CpEz, 47.4°N, 124.7°W [15.0 (12.5-17.2, 0.9) 0.9 (15.4, 14.9<sub>LH</sub>, 14.7) 14.1 °C]

PrtO, 42.7°N [10.4 (7.7 - 15.1, 2.0) 1.5 (10.4, 11.0<sub>LH</sub>, 9.9<sub>H</sub>)°C]

CCty, 41.7°N [14.8 (10.9-17.8, 1.3) 1.6 (14.0, 15.1<sub>H</sub>, 15.3<sub>L</sub>)°C]

EelR, 40.7°N, 124.5°W [12.7 (10.3-16.8, 1.3) 0.9 (13.1, 12.9<sub>H</sub>, 12.1<sub>LH</sub>) 12.9°C]

#### Point Arena 39°N

ArCv, 38.9°N [12.1 (10.1-15.2, 1.0) 0.0 ( 11.3<sub>L</sub>, 12.5, 12.5<sub>H</sub>)°C]

#### Point Reyes 38°N

SFrn, 37.8°N, 122.8°W [13.3 (11.0-16.7, 0.9) 0.2 (12.4<sub>L</sub>, 13.9<sub>H</sub>, 13.5) 14.0°C]

Mtry, 36.6°N [16.7 (13.2 -20.9, 1.5) 0.7 (16.4, 18.1<sub>H</sub>, 15.4<sub>L</sub>)°C]

#### Point Sur (36.3°N)

PrtS, 35.1° [15.3 (11.5 - 18.1, 1.4) 0.5 (14.4<sub>L</sub>, 16.1<sub>H</sub>, 15.6)°C]

PtCn, 34.5°N, 120.8°W [14.8 (11.9-20.3, 1.9)-0.1 (13.2<sub>L</sub>, 15.2, 16.1<sub>H</sub>)°C]

#### Point Conception, 34.4°N

SBCh, 34.3°N, 119.9°W [17.8 (14.2-21.3, 1.5) 0.6 (16.2<sub>L</sub>, 18.0, 19.2<sub>H</sub>) 17.5°C]

SMca, 34°N [19.6 (15.4 -23.6, 1.7) 0.7 (18.5<sub>L</sub>, 19.6<sub>L</sub>, 20.7<sub>H</sub>)°C]

Tory, 32.9°N, 177.4°W [20.8 (17.0-24.4, 1.2) 0.2 (20.1<sub>L</sub>, 20.9<sub>H</sub>, 21.4<sub>H</sub>)°C]

LaJo, 32.9°N [18.9 (13.0-25.7, 3.2) 0.1 (18.0<sub>L</sub>, 19.5<sub>H</sub>, 19.1)°C]

#### Point Loma, 32.7°N

Shore temperature measurements, taken at fixed depth below the lowest tide at NOAA **tide stations**, are in italics: *NeBy* (9443090), *PrtO* (9431647), *CCty* (9419750), *ArCv* (9416841), *Mtry* (9413450), *PrtS* (9412110), *SMca* (9410840), *LaJo* (9410230). (Numbers) lead to detailed location and station descriptions,

<https://tidesandcurrents.noaa.gov/stations.html?type=Physical%20Oceanography>

Near shore buoy measurement details are obtained from number designations: Neah (46087), CpEz (46041), TIMk (46089), EelR (46022), SFrn (46026), PtCn (46218), SBCh (46053), *Tory* (46225) . [https://www.ndbc.noaa.gov/station\\_page.php?station=46087](https://www.ndbc.noaa.gov/station_page.php?station=46087) -

## EQUATORIAL AND SOUTH PACIFIC

During August, El Niño-neutral conditions were expected to continue across the Equatorial Pacific (EP) through the boreal summer, with a 60% chance of becoming La Niña conditions in the fall. Negative subsurface temperature anomalies ( $\geq -2.5^{\circ}\text{C}$ ) became more extensive in the central EP between 25-150 m, as negative SST<sub>Ag</sub> anomaly increased in areal extent across the EP. Positive subsurface temperature anomalies increased below 100 m in the western EP. The eastern EP upper 300 m heat content anomaly became more strongly negative during July and in August appeared to reach a minimum. Positive outgoing radiation anomalies, indicating suppressed convection and precipitation, extended across the EP from 140°E to 180°E/W. Except for the EP and coastal South America, the South Pacific Ocean had about neutral SST<sub>Ag</sub> anomaly east of 135°W and predominately neutral to positive SST<sub>Ag</sub> anomaly to the west. The largest positive anomalies ( $\leq 2^{\circ}\text{C}$ ) west of 180°E/W were north of 30°S. Late August Antarctic sea ice area was greater than recent annual maxima, but lower than 2012, 2013 and 2014 maxima.

<http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/>

[https://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/lanina/enso\\_evolution-status-fcsts-web.pdf](https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf)

<https://www.ospo.noaa.gov/Products/index.html> <https://earth.gsfc.nasa.gov/cryo/data/current-state-sea-ice-cover>

Late August **Sea level height anomaly** (SLA) analyses for the north and south Pacific Ocean showed negative SLA ( $\geq -20$  cm) east of 180°E/W between 20°S and 30°N. Coastal areas of South America had increasing negative SLA  $\geq -15$  cm. At 20°-23°S, negative SLA anomaly extended across the ocean to the coast of Australia. Positive SLA anomaly west of 180°E/W occurred between 0°-12°S and also at 22°-30°S. These analyses extend to 30°S south.

[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/ocean/weeklyenso\\_clim\\_81-10/wksl\\_anm.gif](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wksl_anm.gif) (current)

The NOAA **Oceanic El Niño Index** (ONI) (3-month running mean of ERSST.v5 anomalies in the Niño 3.4 region) decreased during April-May-June (AMJ), MJJ and JJA to 0.0, -0.2, -0.4 respectively, suggesting trend toward La Niña conditions.

[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/lanina/enso\\_evolution-status-fcsts-web.pdf](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf)

<https://climatedataguide.ucar.edu/climate-data/multivariate-enso-index> (alternate El Niño index)

The **Southern Oscillation Index** (SOI). Prolonged periods of negative SOI values, corresponding to below-normal SLP at Tahiti and above-normal air pressure at Darwin, may indicate abnormally warm ocean waters across the eastern tropical Pacific, typical of El Niño. NOAA/PSL SOI values for January-August 2020 are 0.30, -0.10, -0.20, 0.30, 0.70, -0.60, 0.70, 1.8. [https://psl.noaa.gov/data/correlation/soi\\_data](https://psl.noaa.gov/data/correlation/soi_data) [https://psl.noaa.gov/site\\_index.html#s](https://psl.noaa.gov/site_index.html#s) <https://www.longpaddock.qld.gov.au/soi/>

The NOAA/NCEI **Pacific Decadal Oscillation Index** (PDO), calculated from Pacific Basin wide ERSST.v5 was less than -1.30 from January through April and increased to -0.52, -0.75 and -0.81 during May through July, respectively. The PDO

dipped again to -1.25 in August.

<https://www.ncdc.noaa.gov/teleconnections/pdo/> , <http://research.jisao.washington.edu/pdo/PDO.latest.txt>

**North Pacific Gyre Oscillation (NPGO)** variability is positively correlated with fluctuations of salinity, nutrients and chlorophyll in the northeastern Pacific. Monthly NPGO values for 2020 have been between -2.0 and -1.0, with -1.25 for July. The last positive NPGO value was December 2016.

<http://www.o3d.org/npgo/npgo.php> <https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2007GL032838#>  
<http://climexp.knmi.nl/getindices.cgi?WMO=O3DData/npgo&STATION=NPGO...>

The **Pacific / North American Teleconnection Index (PNA)**, computed from atmospheric pressure over the Pacific Ocean and North America had consistently positive daily values during August, with a monthly “Historical PNA index” of 1.80. The Historical PNA indices are monthly averages, standardized by the 1981-2010

climatology. <https://www.cpc.ncep.noaa.gov/data/teledoc/pna.shtml> (Historical Index)  
<https://www.cpc.ncep.noaa.gov/data/teledoc/pna.shtml> (computational alternatives).

August monthly west coast ERD/SWFSC Upwelling Indices (UI) remained upwelling favorable (positive) from 27°N to 45°N. UI was more than 35% greater than average at 39°N and 42°N, similar to the July pattern. UI values and anomalies were negative and of low magnitude at 51°N northward.

<https://upwell.pfeg.noaa.gov/products/PFELData/upwell/monthly/table.2008>

Daily UI at 42°N indicated strong UI episodes during the first 10 and the last 10 days of August while upwelling conditions were more consistent throughout August at 39°N. <https://oceanwatch.pfeg.noaa.gov/products/PFELData/upwell/daily/p09dayac.all> (see computational alternatives)  
<https://oceanview.pfeg.noaa.gov/products/upwelling/dnld> (current)

## **PRECIPITATION and RUNOFF (late August)**

By the end of August Washington and the Columbia River basins had received about average (85-130%) precipitation for the water-year, beginning 1 October 2019. However, Oregon and northern California had large water-year deficits that were between 40% and 80% of 1981-2010 mean precipitation and remained in moderate to severe drought conditions. Generally, the western US was dryer and warmer than average during August.

<https://droughtmonitor.unl.edu> <https://waterdata.usgs.gov/ca/nwis/nwis>  
[https://www.cpc.ncep.noaa.gov/products/global\\_monitoring/precipitation/global\\_precip\\_accum.shtml](https://www.cpc.ncep.noaa.gov/products/global_monitoring/precipitation/global_precip_accum.shtml)  
<https://waterdata.usgs.gov/ca/nwis/current/?type=flow> <https://watermonitor.gov/naww/index.php>  
[https://www.nwrfe.noaa.gov/water\\_supply/wy\\_summary/wy\\_summary.php?tab=4](https://www.nwrfe.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=4)

## **Northwest and Washington River Discharge**

**Fraser River** discharge, measured at Hope (130 km upriver from Vancouver, B.C.) reached a high of 10,600 m<sup>3</sup>/s on 6 July and fell to 6,250 m<sup>3</sup>/s (220,700 cfs) by 31 July. Discharge dropped to 2,800 m<sup>3</sup>/s (98,900 cubic feet per second or cfs) on 31 August. The multi-year Fraser median for 31 August is 2,480 m<sup>3</sup>/s.

<https://wateroffice.ec.gc.ca> (station 08MF005)

The **Queets River** at Clearwater, Washington was flowing at 538 [693/ -286: historical median/ change from previous month as cfs in brackets]. The **Puyallup** at Puyallup was flowing at 1,470 [1,750/ -1,230 cfs]. **Skagit** flow was 6,800 [8,770/ -6,200 cfs] near Mount Vernon. **Stillaguamish** discharge was 224 [335/ -152 cfs] at Arlington. The **Columbia** transport was 151,000 [133,000/ -15,000 cfs] at Vancouver.

## **Oregon River Discharge**

The **Columbia** at the Dalles, Oregon was discharging 95,400 [136,000/ -91,600 cfs]. The **Wilson** at Tillamook, was flowing at 83 [83/ -44 cfs]. At Elkton, **Umpqua**

transport was 913 [1,090/ -19 cfs]. **Rogue** flow was 2,080 [1,710/ 480 cfs] at Grants Pass and 2,290 [2,140/ 340 cfs] at Agness.

### California River Discharge

The **Klamath** near Klamath, California was transporting 3,400 [2,859/ 810]. **Smith** discharge was 231 [286/ -111 cfs] near Crescent City. The **Eel** at Scotia had 60 [104/ -16 cfs] transport. The **Battle Creek**, Coleman National Fish Hatchery flow was 211 [235/ -15 cfs]. **Butte Creek** at Chico had 113 [120/ -2 cfs] transport. **Sacramento** River transport was 11,900 [12,700/1,700 cfs] at Verona and 18,200 [14,400/4,200 cfs] at Freeport. **San Joaquin** flow was 649 [1,160/ 100 cfs] at Vernalis. **Pescadero Creek** transport was 1.0 [1.1/ -1.0 cfs] near Pescadero. **San Lorenzo** River discharge was 8.1 [8.0/ -0.9 cfs] at Santa Cruz. The **Pajaro** at Chittenden was flowing at 4.8 [5.4/ -4.2 cfs]. The **Salinas** near Spreckels was flowing at 37.4 [1.2/ 3.9 cfs]. The **Carmel** at Carmel was not flowing [--/ -1.1 cfs]. The **Big Sur** River near Big Sur, California discharged at 1.2 [1.9/ -21.8 cfs] during the final days of August

### Notes

At **Bonneville Dam** (Columbia River mile 146) total **fall Chinook Salmon** passage was 131,093 adults and 17,046 jacks at the end of August. Jacks are 1-2 years old precocious males. This is the fourth largest cumulative count to date of adult fall Chinook in the last 10 years. The clip rate was nearly 68%, which is higher than average percentage of hatchery fall Chinook. Combined Bright and Tule fall Chinook passage is typically 26% complete on August 31, but in the last 10 years passage has been as much as 49% complete on this date. **Coho Salmon** passage was 19,476 adults and 4,062 jacks at the Bonneville Dam. The to date adult Coho count is the highest in the last 10 years and the jack count is a record high. The Coho run at Bonneville is typically 11% complete at the end of August. The adult hatchery clip rate was about 53% which is higher than average. Counts of **Steelhead Trout** at Bonneville Dam since July 1 total 70,462 fish, which is 44% of the recent 10-year average (75% of recent 5-year averages). Steelhead passage was one of the lowest to date counts in the last 10-years. Passage of the total run at Bonneville Dam (July–October) is typically 71% complete (recent 10-year average). The count of unclipped steelhead since July 1 totals 31,305 fish, one of the lowest cumulative to date counts in the last 10 years. Columbia River flow and water temperature have been near 5-year averages at Bonneville Dam. [https://wdfw.wa.gov/sites/default/files/2020-07/2020\\_or\\_wa\\_fall\\_jointstaffreport.pdf](https://wdfw.wa.gov/sites/default/files/2020-07/2020_or_wa_fall_jointstaffreport.pdf) [https://www.dfw.state.or.us/fish/OSCRP/CRM/FS/20/20\\_09\\_03ff4.pdf](https://www.dfw.state.or.us/fish/OSCRP/CRM/FS/20/20_09_03ff4.pdf)